Antibiotic Treatment of Urinary Tract Infections at a Skilled Nursing Facility in Hawaii

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Introduction

The literature describing antibiotic prescribing patterns to treat urinary tract infections in skilled nursing facilities in Hawaii is limited. Antibiotics are primarily used in skilled nursing facilities to treat urinary tract infections, respiratory infections, skin or soft tissue infections, and gastroenteritis.[1] It is generally believed that organisms isolated in a skilled nursing setting are more resistant.[2] However, this may not be true for some of our facilities in Hawaii. In the community, as well as in the acute care situation, physicians routinely draw urine cultures to determine antibiotic sensitivities. They may need to treat empirically depending on the clinical situation or according to C&S results. Despite the information provided by C&S reports that document the sensitivity of the causative organism to older, less expensive antibiotics, such as amoxicillin, trimethoprim/sulfamethoxazole, or nitrofurantoin, many physicians still opt to use more expensive, broad spectrum antibiotics, such as quinolones, to treat urinary tract infections.[3] This practice may have serious long term implications to an institution in terms of escalating healthcare costs and developing resistant organisms.

Background

An Antibiotic Ad-Hoc Committee was convened at a 158-bed skilled nursing facility in Honolulu, Hawaii to focus on the following issues:

1. To identify the "perceived" problems with antibiotic utilization in our facility
2. To prioritize issues that need to be addressed
3. To design a study plan that defines and quantifies the problem with a time line for each issue to be studied
4. To develop possible strategies to correct any problem identified with antibiotic utilization

The committee initially wanted to characterize the prevalent antibiotic usage patterns of our physicians in the treatment of urinary tract infections. The committee wanted to know what were the most common antibiotics used empirically to treat UTI's. The committee also wanted to know what antibiotics physicians tended to choose when C&S results were available. In other words, did they choose older, less expensive antibiotics when C&S data demonstrated sensitivity or did they choose newer, more broad spectrum, and more expensive antibiotics? If treatment was begun empirically with a newer, more expensive antibiotic, was therapy switched to an older, less expensive antibiotic upon receipt of C&S data that demonstrated organism sensitivity? If not, what would be the cost and clinical implications to our facility with the "overuse" of newer, and more expensive antibiotics?

Methodology

In order to answer these questions, a questionnaire was developed by the antibiotic committee (See Appendix I) and approved by the Pharmacy and Therapeutics Committee. The clinical pharmacist and infection control nurse conducted a retrospective chart review on all available UTI data from July 2001 to February 2002. Unfortunately, only seventeen charts with the required data were available for review, and of these, only fourteen were evaluable.

All patients without catheters had documented UTI's as defined by at least three of the following criteria: fever> 100 degrees Fahrenheit or chills, burning pain on urination, frequency or urgency, flank or suprapubic pain or tenderness, change in the character of the urine, worsening of mental or functional status, urine culture with >100,000 colonies per ml of single uropathogen in patient on appropriate antibiotic therapy. For patients with catheters, documented UTI's were defined by at least two of the above criteria, with the exception of "burning pain on urination."[4]

All antibiotic sensitivities were evaluated for each organism. Sensitivity results were compared with actual treatment choices. A daily antibiotic cost comparison chart was developed to calculate the total costs of antibiotic therapy. These costs were then compared with the overall cost of a less expensive alternative, such as amoxicillin, which had the lowest daily cost, followed by trimethoprim/sulfamethoxazole.

Although documentation in most cases was rather scanty, the study also tried to see if any of these patients experienced any UTI's in the past 30 days to determine if the present UTI was a result of reinfection or a resistant organism. The thought was that therapeutic choice might very well have been influenced by a patient's predisposition to recurrent UTI's.

The Antibiotic Ad-Hoc Committee originally planned to review at least thirty charts, but due to lack of adequate patient information, we were only able to review fourteen charts. Despite the limit of this study, certain trends became readily apparent. Since no study of this kind had ever been conducted at our facility (or any other skilled nursing facility in Hawaii to the best of our knowledge), the committee thought it beneficial to share the results of the study with the medical staff. The committee wanted to see if there was any indirect evidence to support the generally held view that antibiotic resistance is prevalent and, therefore, empiric therapy with quinolones is justified at our facility.

Results

Of the seventeen charts available for review, only fourteen (82%) were evaluable. Females comprised 64 percent of the study, on average, were 6 years older and received, on average, 2.6 fewer days of antibiotic therapy. (Table I)

Quinolones (ciprofloxacin or leuofloxacin) were the predominant drugs used to treat UTI's (57%). (Table II) In seven of these eight cases (88%), based on C&S results, amoxicillin or trimethoprim/sulfamethoxazole, could have been used in lieu of quinolones. C&S tests were ordered before commencing treatment in a vast majority of cases (93%).

Empiric therapy began before receipt of C&S results in five of fourteen cases (36%). In four of these five cases (80%), C&S results showed that the causative organisms were sensitive to either amoxicillin or trimethoprim/sulfamethoxazole. (Table III)

Treatment started after receipt of C&S results in nine of fourteen cases (64%). In all of these cases (100%), C&S results showed that the causative organisms were sensitive to either amoxicillin or trimethoprim/sulfamethoxazole. In no instance was therapy switched upon receipt of C&S data documenting organism sensitivity to a less expensive antibiotic.

Overall, 93 percent of C&S results showed sensitivity to amoxicillin or trimethoprim/ sulfamethoxazole. In 43 percent of cases, UTI's were treated with less expensive, more narrow spectrum antibiotics, while in 57 percent of cases, UTI's were treated with a quinolone, a more expensive alternative. (Table IV) If all non-penicillin allergic patients had been started on amoxicillin, the potential savings to the facility would have been $142.37, which translates to about $1092.00 for every 100 UTI's treated.

None of the patients experienced any UTI's 30 days prior to their most recent UTI. There was no evidence of reinfection or that any of the present UTI's were caused by resistant organisms.

Conclusion

Although data was limited, our study showed that in fewer than half the cases evaluated, physicians chose less expensive, more narrow spectrum antibiotics to treat UTI's. Quinolones, which are expensive, broad spectrum antibiotics, were the predominant drugs used to treat UTI's when less expensive, more narrow spectrum antibiotics could have been chosen. The data in this study needs to be reconfirmed at other facilities and with larger sample sizes. However, the trends noted in antibiotic usage at this facility make an interesting starting point to reexamine the validity of current prescribing practices in Hawaii based on local sensitivity data. The overuse of broad spectrum antibiotics over a prolonged period of time has been associated with the development of resistant organisms and this has serious implications to the health and well-being of an institution's residents.[5] There are also potential cost savings to an institution when non-quinolone antibiotics are appropriately used to treat urinary tract infections. In an era of financial constraints and growing problems with antibiotic resistance, it is imperative that healthcare professionals reexamine the mindset that predisposes clinicians to utilize very powerful, last-line drugs, as a first choice, when older, less expensive alternatives may be equally appropriate.

Acknowledgements

The author wishes to acknowledge the following individuals at Maluhia Long Term Care Facility in Honolulu, Hawaii, for their kind support in the research and publication of this article: Dr. Clifford Chang, Medical Director, Doreen Stanton, Director of

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Table 1.— Demographics

	FEMALES	MALES
Number (%)	9 (64%)	5 (36%)
Average age in years	87	81
Average duration of tx	5.8 days	8.4 days

Table 2.— Drugs Used to Treat UTI's

DRUGS	NUMBER (%)
Ciprofloxacin	7 (50%)
Levofloxacin	1 (7%)
Nitrofurantoin	2 (14.5%)
Amoxicillin	2 (14.5%)
TMP/SMX	1 (7%)
Penicillin VK	1 (7%)

Table 3.— Drug Study Results (N=14)

STUDY QUESTION	NUMBER (%)
C&S ordered BEFORE treatment started	13 cases (93%)
Treatment started BEFORE receipt of C&S	5 cases (36%)
Organisms SENSITIVE to amoxicillin	4/5 cases (80%)
Treatment started AFTER receipt of C&S	9 cases (64%)
Organisms SENSITIVE to amoxicillin	9/9 cases (100%)
Overall amoxicillin-sensitive organisms	13 cases (93%)
Patients allergic to amoxicillin	2 cases (14%)
Potential savings if started on amoxicillin	$142.37
Potential savings for 100 UTI's treated	$1092.00

Table 4.— Relative Daily Cost Index of Antibiotic Regimins Used to Treat UTI's (Amoxicillin = 1.0 = least expensive regimen)

DRUG	REGIMEN	COST INDEX
Ciprofloxacin	250mg PO BID	5.9
	500mg PO BID	6.9
Levofloxacin	250mg PO QD	10.1
	500mg POQD	11.8
Amoxicillin	**250mg PO TID**	**1.0**
	500mg PO TID	1.5
TMP/SMX (Bactrim DS)	1 DS tab PO BID	2.3
Nitrofurantoin (Macrobid)	100mg PO BID	5.0

Appendix One

Drug Utilization Review Criteria

Patient Name: ________________________ Medical Record No: ____________
Sex: _____ Age: _____ Physician: ________________________
Drug Allergies: ____

1. C&S ordered for suspected UTI? ___ Yes ___ No

2. Cultures taken before antibiotic started? ___ Yes ___ No

3. Date C&S results received at Maluhia? __________ Date reported to MD: __________

4. Antibiotic prescribed: ________________________________

5. Date started: ______________ Duration of Therapy: ______________

6. Last UTI for this patient: ________________________________

7. C&S Results:
    A. Organism: ________________________________
    B. Sensitive to: ________________________________
    ____
    C. Resistant to: ________________________________
    ____

8. If organism was sensitive to less expensive antibiotic, was therapy switched? ___ Yes ___ No

10. Any documentation explaining why therapy was not switched? ___ Yes ___ No

11. Potential Cost Savings in Switching of Antibiotic Therapy:
    A. Cost/day of therapy = ________ x _____ days = __________
    B. Cost/day of alternate therapy: __________
    Number of Days Left in Switch: __________
    Total Cost: __________
    C. Cost/day of original therapy: __________
    Number of days received: __________
    Total Cost: __________
    D. Total Cost B + C = __________
    E. **POTENTIAL COST SAVINGS (A – D)** __________

12. Potential Cost Savings if Therapy Started Empirically with Less Expensive Antibiotic:
    A. Cost/day of therapy: ________ x _____ days = __________
    B. Cost/day alt. therapy: ________ x _____ days = __________
    C. **POTENTIAL COST SAVINGS (A – B)** __________

Nursing, Linda Spaulding, Infection Control Nurse and Education Consultant, Dr. Gary Johnson, Gerontologist, and members of the Pharmacy and Therapeutics Committee.

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Editor's Note:

The material in this manuscript was initially presented at a Longterm Care Meeting at the Maluhia Nursing Center and brought to my attention by geriatrician Gary Johnson MD.

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- Keep the number of the Hawaii Poison Center on or near your telephone.
- If you suspect a poisoning, do not wait for signs and symptoms to develop. Call the Hawaii Poison Center immediately.
- Always keep Ipecac Syrup in your home. (This is used to make a person vomit in certain types of poisoning.) **Do not use Ipecac Syrup unless advised by the Hawaii Poison Center.**
- Store all medicines, chemicals, and household products out of reach and out of sight, preferably locked up.
- A good rule to teach children is to "always ask first" before eating or drinking anything—don't touch, don't smell, don't taste.

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